

## DYNAMICS OF LAND USE PATTERN IN BASTAR PLATEAU OF CHHATTISGARH: A TEMPORAL AND SPATIAL ANALYSIS

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### ABSTRACT

*The present study was undertaken with the broad objectives, viz. To study the dynamics of the land-use pattern at Chhattisgarh state and Bastar plateau. The State was comprised of three agro-climatic zones, Northern Hills, Chhattisgarh plains and Bastar plateau. Bastar plateau out of three agro-climatic zones Bastar plateau was selected. For this, secondary data on land use statistics for 32 year's period from 1984-85 to 2000-15 were collected from the different publication of Government of Chhattisgarh. For the estimation, the data were grouped under two periods i.e., first period (1984-2000) before formation of Chhattisgarh state and the second period (2000-15) before Chhattisgarh state. Regarding the temporal change in different land use categories, it was observed that during 1984-2000 net area sown was decreased, whereas, other categories had a non- significant growth rate. 2000-15 the forest land and permanent pasture had significant growth rate the net area is sown was estimated to be significant and decreased in period 1984-2000, whereas, the growth rate for permanent pasture and other fallow land were estimated to be non-significant but they increased by 0.28 and 0.86 annually. During the period of 1984-2000 in Bastar plateau culturable waste had positive and significant growth rate (0.98 per cent per annum), whereas, during 2000-15 the forest land increased significantly by 0.130 per cent annually.*

**KEYWORDS:** Dynamics, Land Use Pattern & Temporal Change

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### INTRODUCTION

The land is a scarce resource, whose supply is fixed for all practical purposes. At the same time, the demand for land for various competing purposes is continuously increasing with the increase in human population and economic growth. Land use pattern any given time is determined by several factors including the size of human and livestock population, the demand pattern, the technology in use, the cultural traditions, the location and capability of land, institutional factors like ownership pattern and rights and state regulation. The land use pattern besides having economic implications has also important ecological dimensions, which if ignored can have disastrous consequences. Chhattisgarh lays emphasis on developing the state's rich mineral, forest, and other natural resources on a sustainable basis to achieve the targets of rapid economic and social growth. Like any other resource, the land has two dimensions, viz, quality and quantity, and both of these crucial aspects are under serious threat due to the intensive and extensive use of land both for agricultural and non-agricultural purposes. The competition between agriculture and non-agriculture sectors for land is intensifying due to the increasing pressure on land for food production on one hand and housing, industrial expansion, a creation of infrastructural facilities etc. on the other hand. Considering these all aspects, the land use dynamics in Northern

hills of Chhattisgarh was studied with the objectives, the dynamics of the land-use pattern at the state and Bastar plateau and the temporal changes in land use.

## METHODOLOGY

The present study pertains to Bastar plateau of Chhattisgarh. For studying temporal changes in land use pattern growth rates of the land use category were grouped into following two periods I period 1984-2000 and II period 2000-2015. The secondary data on various land use categories for districts and Chhattisgarh as a whole were drawn from various published and unpublished sources like annual season and crop reports, statistical outlines of Chhattisgarh, commissioner of land records and settlement etc.

### Estimation of Growth Rates

Compound growth rates for various land use categories will be worked out on the basis of log-linear regression equations.

$$Y = AB^t$$

Where,

A is the constant, B is the regression coefficient and t is the time

$$\text{and CGR} = (B - 1) * 100$$

Where,

CGR is the Compound Growth Rate

Analysis of instability in an area under different land use categories:

Instability index is a simple analytical technique to find out the fluctuations or instability in any time series data.

It is estimated as follows:

- Estimate the parameters of a log-linear trend line for the variable ( $Y_t$ ) for which instability is to be estimated.
- If the estimated parameter is statistically significant, then the instability index (IIN) is defined as

$$IIN = CV \times (1-r^2)^{0.5}$$

Where,

CV = Coefficient of variation

$r^2$  = Coefficient of determination

$$CV = \frac{SD}{Mean} \times 100$$

Where,

SD = standard deviation

- If the estimated parameter in the regression equation is not significant, then the CV itself is the instability index.

### Location Coefficient

Location coefficient is used to identify the pattern of distribution of the given category of lands across different regions of the state. This is defined as follows:

$$L = \frac{L_{ij} / L_i}{L_j / L_s}$$

Where,

$L$  = Location co-efficient

$L_{ij}$  = Area of  $j$ -th category of land in  $i$ -th agro-climatic zone

$L_i$  = Area of all categories of land in the  $i$ -th agro-climatic zone

$L_j$  = Area of  $j$ -th category of land in the Chhattisgarh state

$L_s$  = Area of all categories of land in the Chhattisgarh state

A higher value of location coefficient for an agro-climatic zone or region indicates the higher concentration of that particular category of land in that agro-climatic zone or the region.

## RESULTS AND DISCUSSIONS

To study the changes in land use pattern over a period of time as well as in different periods the relative percentage of area under deferent categories of land use to the total area of Bastar plateau agro-climatic zone of Chhattisgarh was worked out and result is presented in Table 1

The table 1 revealed that changes in different land use categories in Bastar plateau. In Bastar plateau the forest (-0.4%), barren,(-0.20%) and permanent pasture land (-0.03) were estimated to be negative relative change, whereas, other land use categories had positive relative change i.e., non-agricultural uses (0.35 per cent), culturable waste (0.22 per cent), current fallow (0.40 per cent ), other fallow (0.24 per cent) and net area sowed (0.04 per cent ). The forest land was decreased from 64.10 per cent in 1984-85 to 61.54 per cent in 2015-16 which was because off diversion of forest lands for non- agricultural purposes like, building construction, road network, industrial development etc. In case of current fallow land was increased from 1.24 per cent in 1984-85 to 1.74 per cent in 2015-16.

**Table 1: Land Utilization Pattern of Bastar Plateau**  
(Per cent)

S. No.	Particulars	Bastar Plateau		Relative Change (per cent)
		1984-85	2000-15	
1.	Forest	64.10	61.54	-0.04
2.	Barren	3.25	2.60	-0.20
3.	Non-agricultural uses	2.21	2.98	0.35
4.	Culturable waste	4.26	5.21	0.22
5.	Permanent pasture	3.74	3.64	-0.03
6.	Misc. tree crop	0.00	0.00	0.00
7.	Current fallow	1.24	1.74	0.40
8.	Other fallow	1.22	1.51	0.24
9.	Net area sown	19.98	20.78	0.04
Total geographical area (000'ha)		(100.00) 3905.74	(100.00) 3905.74	

### Compound Growth Rate of Bastar Plateau

To examine the spatial and temporal growth of land under various use in Chhattisgarh state the compound growth rate was worked out, the results which are presented in table 2 and 3. During the period of 1984-2000 Bastar plateau, culturable waste had positive and significant growth rate (0.98 per cent per annum), whereas, permanent pasture decreased by -1.13 per cent annually. The forest land (-9.01%), barren land (1.53), non-agricultural uses (-0.17), other fallow (-0.15%) had negative growth rate and non-significant, whereas, current fallow (1.18%) and the net area is sown (1.29%) had positive but non-significant growth (Table 2).

During the period of 2000-15 Bastar plateau, the forest land increased significantly by 0.130 per cent annually, whereas non- agricultural uses, current fallow had positive but not significant growth. The growth rate for barren land (-0.29%), permanent pasture (-0.910%), miscellaneous tree crop (-15.81%) and net area sown (-2.24%) other fallow (-0.43%) were negative and non-significant growth (Table 2)

**Table 2: Compound Growth Rates of different Land Use Categories in Bastar Plateau of Chhattisgarh (Per cent per Annum)**

S. No.	Particulars	Bastar Plateau	
		1984-2000	2000-15
1.	Forest	-9.01	0.130*
2.	Barren	-1.53	-0.299
3.	Non-agricultural uses	-0.17	1.479
4.	Culturable waste	0.98**	0.130**
5.	Permanent pasture	-1.13**	-0.910
6.	Misc. tree crop	0.00	-15.81
7.	Current fallow	1.18	2.038
8.	Other fallow	-0.15	-2.244
9.	Net area sown	1.29	-0.430

Note- \*\* 1% level of significant

\*5% level of significant

### Instability Index of different Land Use Categories

The instability index for different land use categories in Bastar plateau Agro-climatic zone of Chhattisgarh was calculated to find out the instability during 1984-2000 and 2001-16. During the period 1984-2000, the instability index was in forest land (7.19) followed by land for non-agricultural uses (3.33) and Barren land (1.84) respectively, whereas, the instability index was less in other categories of land. During the period of 2000-15 Bastar plateau, the instability was high in miscellaneous tree crop (223.70) followed by other fallow (6.62), current fallow (3.06) and permanent pasture (2.21) respectively. In the case of forest land and non- agricultural uses instability index was decreased.

**Table 3: Instability Index of different Land Use Categories in Bastar Plateau**

S. No.	Particulars	Bastar Plateau	
		1984-2000	2000-15
1.	Forest	7.19	0.11
2.	Barren	1.85	1.57
3.	Non-agricultural uses	3.33	2.13
4.	Culturable waste	0.70	0.41

Table 3:Contd.,			
5.	Permanent pasture	1.16	2.21
6.	Misc. tree crop	-	223.70
7.	Current fallow	1.70	3.06
8.	Other fallow	0.75	6.62
9.	Net area sown	1.06	0.34

#### Location Co-efficient of different Categories of Land in Bastar Plateau

The location coefficient was estimated to study the spatial dynamics of different types of lands concentration for two periods of study i.e. 1984-85 and 2015. The results of the analysis are presented in Table 4

The table 4 revealed that the concentration of forest land was 1.33 during the period of 1984-85 and it was 1.34 during the period of 2014-15. During 2014-15 the concentration of barren land was (1.25) followed by land for non-agricultural uses (0.56) and culturable waste (1.97) respectively.

**Table 4: Location Co-efficient of different Land Use Categories in the Bastar Plateau**

S. No.	Particulars	Bastar Plateau	
		1984-85	2000-16
1.	Forest	1.33	1.34
2.	Barren	1.16	1.25
3.	Non-agricultural uses	0.48	0.56
4.	Culturable waste	1.77	1.97
5.	Permanent pasture	0.63	0.57
6.	Misc. tree crop	0.01	0.01
7.	Current fallow	0.75	0.85
8.	Other fallow	0.68	0.79
9.	Net area sown	0.68	0.62

## CONCLUSIONS

The dynamic of land use pattern in Bastar plateau of Chhattisgarh, during the period of 2000-15 the forest land was increased by 0.13 per cent annually and also culturable waste was increased by 0.130 per cent annually, whereas, other land categories were found to be non – significant growth. During the period of 2000-15 Bastar plateau, the instability was high in miscellaneous tree crop (223.70) followed by other fallow (6.62), current fallow (3.06) and permanent pasture (2.21) respectively. In the case of forest land and non- agricultural uses instability index was decreased. In case the concentration of forest land was 1.33 during the period of 1984-85 and it was 1.34 during the period of 2000-16 and the concentration of barren land (1.25) land for non-agricultural uses (0.56), cultural waste (1.97) were also increased.

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